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TECHNICAL REQUIREMENTS FOR POWER TAKE OFF PULLEY FOR AGRICULTURAL TRACTORS WITH TYPE 1 PTO SHAFT

(First Reprint NOVEMBER 1997)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 2 *October* 1981

Indian Standard

TECHNICAL REQUIREMENTS FOR POWER TAKE-OFF PULLEY FOR AGRICULTURAL TRACTORS WITH TYPE 1 PTO SHAFT

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AMENDMENT NO. 1 OCTOBER 1995
TO
IS 9869 : 1981 TECHNICAL REQUIREMENTS FOR POWER TAKE-OFF PULLEY FOR AGRICULTURAL TRACTORS WITH TYPE 1 PTO SHAFT

(*Cover page, pages* 1 *and* 3, *Title*) — Substitute the following for the existing title:

'TECHNICAL REQUIREMENTS FOR POWER TAKE-OFF PULLEY ASSEMBLY FOR AGRICULTURAL TRACTORS'

(*Page* 4, *clause* **1.1**) — Substitute the following for the existing clause

'**1.1** This standard covers dimensions, safety and other requirements and performance test for power take off pulley assembly suitable for Type 1 and Type 2 PTO of agricultural tractors.'

(*Page* 4, *clause* **2.1**, *Note* *and clause* **4.1**) — Substitute 'IS 4931 1995' *for* 'IS . 4931 - 1977'.

(*Page* 4, *clause* **3.3**) — Substitute 'Types 1 and 2 PTO of IS 4931 1995' *for* 'Type 1 PTO of IS 4931 : 1977'

(*Page* 4, *foot-note with* '* *mark*) — Substitute 'Agricultural tractor — Rear mounted power take-off type 1 2 and 3 (*third revision*)' for the existing foot-note

(*Page* 5, *clause* **6.1**, *last line*) — Substitute 'Types 1 and 2 PTO shaft as given in IS 4931 - 1995' *for* 'Type 1 PTO shaft as given in IS 4931 - 1977'.

(*Page* 5, *clause* **6.2**) — Substitute '**5** of IS 5994 1987' *for* '**4.1** and **6.1** of IS 5994 (Part II) - 1979'

(*Page* 5, *foot-notes with* '†' *and* '‡' *marks*) Substitute the following foot-notes for the existing

'†Agricultural tractor — Rear mounted power take-off type 1, 2 and 3 (*third revision*).

‡Test code for agricultural tractor (*second revision*).'

(*Page* 6, *clause* **7.1**) — Substitute the following for the existing matter

'**7.1** ***Marking*** — *The pulley assembly shall have standard nameplate with* following details:

a) Make,

b) Year of manufacture,

c) Power rating,

d) Gear Ratio, and

e) Standard input RPM.'

(*Page* 6, *clause* **8.1**) — Substitute 'IS 7201 (Part 1) : 1987' *for* 'IS 7201 - 1974'

(*Page* 6, *foot-note with* '*' *mark*) — Substitute 'Method of sampling for agricultural machinery and equipment: Part 1 Hand tools and hand operated/animal drawn equipment (*first revision*)' for the existing foot-note

(FAD 32)

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Indian Standard

TECHNICAL REQUIREMENTS FOR POWER TAKE-OFF PULLEY FOR AGRICULTURAL TRACTORS WITH TYPE 1 PTO SHAFT

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 July 1981, after the draft finalized by the Agricultural Tractors and Power Tillers Sectional Committee had been approved by the Agricultural and Food Products Division Council

0.2 Power take-off (PTO) pulleys are being used for transmitting power from tractors to the belt-pulley operated agricultural equipment, such as power thresher, chaff cutter and pump sets The dimensions and quality of indigenously made pulley vary considerably A need was, therefore, felt to prepare Indian Standard on the subject to help the manufacturers in production of quality pulleys

0.3 Three types of PTO are covered in IS 4931-1977 However, presently mostly Type 1, PTO covered in IS 4931-1977*, is being used in indigenous tractors Hence in this standard, the dimensions relating to pulleys used in relation to Type 1 PTO have been included As and when the dimensions and other details of pulleys for type 2 and 3 PTO are available, the same would be incorporated in this standard

0.4 In the preparation of this standard, assistance has been derived from M/s Mahindra and Mahindra Limited (International Tractor Division), Bombay and Tractor Training and Testing Station (Ministry of Agriculture), Budni

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2 - 1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Specification for power take-off shaft of agricultural tractors (*first revision*).

†Rules for rounding off numerical values (*revised*)

1. SCOPE

1.1 This standard covers dimensions, safety and other requirements and performance test for power take-off pulley suitable for Type 1 PTO of agricultural tractors

2. RATED SPEED

2.1 The rated speed of the pulley at rated PTO speed shall be 15.75 ± 0.25 m/s

NOTE — The rated PTO speed shall be as given in IS 4931-1977*

3. DIMENSIONS

3.1 The width of the pulley (*see* A in Fig 1) shall be minimum of 160 mm

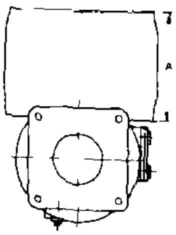

FIG. 1 BELT PULLEY ASSEMBLY

3.2 The crown of the pulley shall be in accordance with IS 1691-1980†

3.3 The dimensions of splines of the hub shall be as given for Type 1 PTO of IS 4931-1977*

3.4 The mounting dimensions of the pulley shall be as agreed to between the purchaser and the supplier

4. OTHER REQUIREMENTS

4.1 The direction of rotation shall be clockwise when viewed from the pulley end and when engaged with PTO whose direction of rotation is in accordance with IS 4931-1977*

4.2 The centre line of pulley shall be at right angle to the centre line of PTO

---

*Specification for power take off shaft of agricultural tractors (*first revision*)

†Specification for cast iron and mild steel flat pulleys (*second revision*)

4.3 The pulley shall meet the requirements given in **6, 7** and **8** of IS : 1691 - 1980*.

4.4 The pulley shall be supplied with operator's manual The manual shall include the following details among others

a) Lubrication instructions indicating grade of oil, minimum and maximum oil levels and frequency of oil change; and

b) maximum belt tension

5. SAFETY REQUIREMENTS

5.1 The pulley shall be provided with a shield

5.2 The shape of the shield may be as given in Fig. 2. The dimension x in Fig. 2 shall be adjusted to be as minimum as possible.

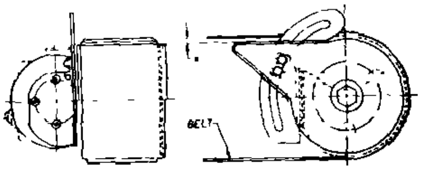

FIG 2 SAFETY SHIELD FOR PTO BELT PULLEY

5.3 The shield shall have sufficient strength to support a load of 980 N without taking permanent set

6. PERFORMANCE TEST

6.1 For conducting the performance test, the belt pulley shall be tested for its capacity of transmitting power at least 10 percent in excess of power rating declared by the belt-pulley manufacturer. In the absence of declared power rating, the belt pulley shall be tested corresponding to power rating specified for Type 1 PTO shaft as given in IS . 4931-1971†.

6.2 The conditions given in **4.1** and **6.1** of IS 5994 (Part II)-1979‡ shall be followed.

6.3 The belt pulley shall be tested for 24 hours duration comprising of 3 cycles of 8 hours each in the following sequence of loading

a) 2½ hours at 100 percent of rated load,

---

*Specification for cost iron and mild steel flat pulleys (*second revision*)

†Specification for power take-off shaft of agricultural tractors (*first revision*).

‡Test code for agricultural tractors Part II Laboratory and track tests (*first revision*).

b) ½ hour at 50 percent of rated load,

c) 1 hour at 110 percent of rated load,

d) 2 hours at 75 percent of rated load, and

e) 2 hours at 100 percent of rated load

6.4 During the test, the belt-pulley oil shall be topped up when required and the quantity consumed shall be recorded

6.5 During the test, the belt-pulley oil temperature shall be maintained and recorded Oil temperature shall not exceed 130° If special grade of oil is recommended, the temperature limit for the same shall be stipulated by the manufacturer Oil leakage, if any, shall be recorded

6.6 At the end of each 8-hour cycle, the test shall be stopped and necessary servicing and minor adjustments may be carried out in accordance with the manufacturer's recommendations

NOTE 1 — If the test needs to be stopped during any 8 hour period of one cycle for any minor attention, the running time of that period shall not be counted as part of the test and the cycle shall be repeated

NOTE 2 — In case of major breakdown, the entire test shall be repeated from the beginning

6.7 At the end of the tests, the belt pulley shall be dismantled and inspected for any visual wear and damage The backlash of meshing gears shall be measured and reported

6.8 The test data shall be recorded in Appendix A.

7. MARKING AND PACKING

7.1 Marking — The pulley shall be marked with the following particulars

a) Manufacturer's name and recognized trade-mark, if any ,

b) Batch or code number, and

c) Direction of rotation

7.2 Packing — The pulley may be packed for safe handling in transit and storage as specified by the purchaser

8. SAMPLING FOR LOT ACCEPTANCE

8.1 Unless otherwise agreed to between the purchaser and the supplier, the method of sampling of pulley and criteria for conformity shall be as given in IS 7201-1974*

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*Method of sampling of agricultural machinery and tractors

8.1.1 The classification of different requirements of this specification for the purpose of lot acceptance is given below for guidance

a) *Dimensional and visual requirements* — *See* 3, **4** (except **4.4**), **5** (except **5.3**) and **7.1**.

b) *Requirement other than dimensional and visual* — *See* **2**, **4.4**, **5.3** and **6**.

APPENDIX A

(*Clause* 6.8)

DATA SHEET FOR BELT-PULLEY TEST

1. **Fixture for Pulley**
   - a) Tractor
     - i) Make
     - ii) Model
   - b) Detail of other fixture, if used
2. **Rated Power of Pulley, kw/(hp)**
3. **No-Load Speed, rev/min**
   - a) Engine (tractor or other fixture)
   - b) Pulley
4. **Rated Speed, rev/min**
   - a) Engine
   - b) Pulley
5. **Speed Corresponding to Standard Linear Belt Speed, rev/min**
   - a) Engine
   - b) Pulley
6. **Ratio Between Pulley and Engine Speed**
7. **Lubricating Oil Used**
8. **Test Data** (*see* **page 8**)
9. **Backlash, mm**
10. **Visual Observations**

DATE OF TEST	CYCLE NO	LOAD, kN	SPEED, REV/MIN			TORQUE, kN m	BELT POWER, kW	PULLEY OIL TEMPERATURE °C	ATMOSPHERIC CONDITIONS		
			Crank shaft	PTO pulley	Dynamometer pulley				Temperature °C	Pressure, kPa	Relative Humidity, Percent
(1)	(2)	(3)	(4)	(5)	6)	(7)	(8)	(9)	(10)	(11)	(12)

Testing Engineer

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